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REVIEW OF THE SOVIET BLOC COPPER POSITION

CIA/RR MP-113

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CIA/RR MP-113
(ORR Project 24.321)

Review of the Soviet Bloc Copper Position

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REVIEW OF THE SOVIET BLOC COPPER POSITION

Among the tonnage metals, copper ranks next to iron and steel as a critical component of a national economy. It is correspondingly an important article of trade and particularly so on an international basis where national deficiencies are involved or can be satisfied. The utilization of copper is a key factor to both electric and electronic developments in modern preparations for war and in industry. As such, its availability is both a limit to and a measure of a military and industrial expansion.

In the Soviet Bloc, copper plays an essential part in the political and military objectives of the USSR. In a country which has no history of substantial secondary accumulation by ultimate consumers of this metal and which will probably reach not much more than minimum production needs within the relatively near future, any timely acquirement of quantities of this commodity may have a key significance in the turn of international events.

The likelihood of military action based on realistic planning of an aggressor nation depends on its confidence in its economy to meet not only the direct military items essential to a brief campaign but to sustain a fairly prolonged military effort and to recover from serious tactical retaliations. In this connection, copper is absolutely essential for continued production of direct military items and their immediate sustaining industries, for the maintenance of communications, for food production for military and military support personnel and for the minimum metal requirements of an existing civil population. Individual deficiencies of copper can be tolerated over brief periods of time with only tactical hindrances to a war effort. Accumulative deficiencies and inadequacies in times of criticalities or for critical functions can, however, spell the turn of military events.

In the Soviet Bloc countries there is a recognized deficiency in the copper supply to meet planned needs. Particularly is this deficiency felt for use in modern developments constituting an advanced technology. Such limitations are especially significant in efforts of the Bloc to attain a war potential sufficiently advanced so that agressive action may be risked.

In view of the contributary or even critical role that copper might play in the objectives and potentialities of the USSR, the following analysis is prepared to provide basis for a factual appraisal.

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1. Unique Properties of Copper of Strategic Significance.

Copper is unique among tonnage metals in its high electrical conductivity, second only to silver, displaying 95 percent of the latter's conductivity. Important to efficient heat transfer processes is copper's high thermal coefficient which again is second among metals only to silver. It is highly corrosion resistant in most environments and has good strength and other important service properties. Yet copper and its alloys are readily machined, formed, welded and are adapted to complex design or relative intricacy.

Copper lends itself to a variety of alloys which can be selected to fill a diversity of service requirements. Many of these alloys have unique and special properties that have no fully comparable substitutes. Among these are the following: a large variety of brasses; the tin, beryllium, aluminum and silicon bronzes; monel metal; and hard, high-conductivity coppers. As an addition agent to other than copper-base alloys, copper has additional important uses.

In many applications, there is no substitute for copper or its alloys where a combination of properties are necessary. It retains its tensility

in sea water and certain important chemicals. It is non-magnetic, has non-sparking properties, is non-seizing in contact with moving parts, and is adapted to easy repairs. It is particularly adapted to fabrication under field conditions and where emergencies arise. Where non-copper replacements have been made under conditions of material scarcities, the services or operations concerned have frequently been halted by premature failures or by the substitute material reacting unfavorably with other components or with the requirements of a functional design. Sometimes redesign or reconstruction is necessary to utilize other than copper-base metals.

2. Military Uses of Copper.

Copper and copper-base alloys have important uses in a number of military applications. They are used for rotation bands and fuse parts in ammunition and to some extent for cartridge cases. They find use in the following: armored force and other military vehicles; parts for artillery and small arms; military communication equipment and military telephone wiring; fire control equipment; miscellaneous ordnance; electrical equipment; aircraft frames, aircraft engines, and their maintenance items; and naval and auxilary craft and equipment thereof.

An even greater use is in the military support production both preparatory to warfare and to sustain warfare. These may be exemplified in most industrial machinery, of both operative and auxiliary categories. Among these are motors and electrical controls, internal wiring and power lines, telephone and other communication equipment, process vessels, tubing and connectors, fire-fighting equipment, chemicals, and so forth.

Representative items of military use include wiring and electrical conductors of many kinds in land vehicles, naval and marine vessels and aircraft, automotive radiators, fatigue-resistant tubing and pressure connectors, telephone and radio equipment, welding equipment, mine detectors, field kitchens, marine and other transport bearings, propellor shafts, condenser tubing, periscopes, and so forth. 1/ The aggregative quantity of copper employed in such items is often considerable because of the great diversity of its use.

3. Substitutability for Copper.

Because of the over-all shortage of copper in the Soviet Bloc, aluminum is used wherever possible for specially selected electrical applications. In particular, aluminum can replace copper in high-tension power transmission lines and for urban power distribution. It is also usable in winding for some types of motors and generators. Because larger sizes of motors are required where aluminum is employed, however, it is not adapted to established designs, or to new designs, where space is at a premium or where cooling properties coupled with space limitations are encountered. Technical problems of manufacture in certain motor equipment also present difficulties for aluminum substitutions. In illustration of these problems, there are the less satisfactory means of welding or soldering aluminum, as compared to copper, and the relative brittleness of these junctions.

To obtain equal conductive capacity to copper the cross section for aluminum must be increased in accordance with its 64.5 percent conductivity of the former. Also, unalloyed aluminum has less mechanical strength and less resistance to atmospheric or wet corrosion than has copper. In aluminum transmission lines, structural re-enforcement, such as by steel cores, is necessary. In other applications where electrical wiring is subject to repeated cycles of strain involving movement and stress for critical applications, the use of copper is practically mandatory. Nor is aluminum considered reliable in underground transmission, where corrosion is ever present.

The Soviet appreciation of the essentiality of copper is seen in reports of its specification of this metal to the exclusion of substitutes in new electrical equipment being produced in East Germany. 2/ Also, in repair of electrical machinery from the USSR, copper is used extensively despite its relative scarcity. 2/

In automotive or aircraft electrical wiring, copper is specifically necessary to withstand vibration and corrosive attack. The ready formability, weldability, and resistance to stress corrosion makes copper necessary in automotive radiators to the exclusion of substitutes that have been experimentally tested.

Special low-carbon steel is being used generally to replace cartridge case brass in case guns or small arm ammunition. In rapid-fire guns, steel cases are basically more apt to stick or to jamb. 3/ Hence, the steel casing involves greater technical problems of manufacturing control. More careful testing and inspection and additional safeguards against corrosion is necessary, particularly on prolonged storage. These problems could also introduce complications in Soviet production of wartime quantities where technological difficulties must be solved separately by each manufacturing source. Another economic advantage of brass cases, especially in the larger caliber, is that they can be salvaged. Steel in fired cases on the other hand corrodes too readily for such recovery.

For some marine uses such as propellors there have been developed no satisfactory substitutes for copper alloys. 4/ The consequences of service failures are too serious to warrant gambling with short life and unreliable replacements.

4. Bloc Plan Goals and Production.

Estimates of Bloc production of primary plus secondary copper for 1953 through 1955 and estimates of Bloc capacity for 1955 are presented in Table 1.* Very little positive information on plan goals for copper production is available. This is characteristic of Soviet security practice where difficulties are encountered in attaining critical production objectives for essential commodities. In general, plan goals are set for accomplishment over a Five Year Plan period rather than by a one year period, but they are revised so frequently in view of practical realizations that they are of limited value for comparison with actual performance data.

The following plans for the three largest copper-producing countries of the Bloc are available:

USSR. Production to increase 90 percent over 1950 by 1955. 6/ Based on the ORR/M/NF estimate for 1950 production of 275,000 metric tons, this would mean planned production of about 520,000 metric tons, which compares favorably with 510,000 metric tons estimated actual production in 1955.

East Germany. 49,185 metric tons production planned for 1953 7/ compared with 41,600 estimated actual production; 8/ and 44,000 metric tons planned production in 1954, 9/ compared with 41,600 metric tons of estimated actual production. 10/

Poland. For 1955, planned production is 25,000 metric tons. 11/ It is estimated, as shown in Table 1, that this goal will probably be reached.

Regarding the metallurgical quality of the copper production in the Bloc, there is no indication but that all acceptable grades of copper, including that of highest purity, cannot be produced. A report from China 12/ for example, states that copper of high purity (99.99 percent), comparable with the highest international standards, is being obtained. The technology of producing high grade fire-refined and electrolytic coppers is well known to all those in this industrial field. While technical problems of efficient and extensive recovery of copper from its ores as a material for subsequent refinement appears to offer serious problems to the Soviet, this is not usually reflected in the quality of the final metal.

5. Copper Production Problems.

In general, the production of copper in the USSR appears to be seriously hindered by the relatively lean ores of their more important operations.

* Table 1 follows on p. 4

Table 1

Estimated Bloc Production of Refined Copper, 1953-55 a/5/

Metric Tons

	Bloc	USSR	China	Albania	Bulgaria	Czechoslovakia	East Germany	Hungary	Poland	Rumania
1953 Production	422,200	350,000	11,000	1,000	2,000	600	41,600	0	15,000	1,000
1954 Production	483,700	405,000	11,500	1,500	2,500	600	41,600	0	20,000	1,000
1955 Production	599,100	510,000	12,500	2,000	3,000	600	44,000	0	25,000	2,000
Capacity	737,100	620,000	15,000	2,500	7,000	600	65,000	0	25,000	2,000

a. Production estimates are based on indigenous supplies--ore and secondary recovery. No ore or blister copper is imported.

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On the basis of a thoughtful study made by the Economic Defense Division of the CIA, a minimum estimate of diversions completed is 41,500 metric tons. A somewhat more representative figure might be of the order of 50,000 metric tons. 19/ Procurement efforts interrupted are about twice this figure and commercial efforts of undetermined outcome are also in the range of 100,000 metric tons. The Economic Defense Division study involved the examination of 135 cases covering about 233,000 metric tons of copper and valued at some $185,000,000.

For further examination of the aspects of this type of trade and the methodology of estimating its amount, additional information is presented in Appendix A of this review.

Reported exports of copper from the Bloc are negligible; in 1952 they totaled some 340 metric tons; in nine months of 1953, 4 metric tons. 20/

7. Intra-Orbit Trade.

The tonnages of copper recorded as moving within the Bloc during 1949-53 are presented in Table 2.* The coverage of this compilation is necessarily incomplete; total intra-Bloc trade is very probably considerably larger than indicated here. The data presented, however, furnish an indication of at least part of the general pattern of intra-Orbit trade.

According to the data in Table 2, the USSR has been the largest intra-Bloc supplier of copper. In 1952, recorded actual and planned, shipments from the USSR totalled 48,500 metric tons. Czechoslovakia and East Germany have been the largest recipients of copper, according to these data, receiving 20,435 and 10,950 metric tons respectively, in 1952. All but a small fraction of these imports was from the USSR. No transportation or other difficulties in the transfer of copper within the Bloc have been reported.

The data above demonstrate Bloc ability to transfer copper between countries, as needed. Thus retention of trade controls on any one Bloc country while lifting controls on others is of practically no value.

* Table 2 follows on p.7

This condition has become more serious with the depletion of the richer deposits of the Urals which have in the past been a major source of raw material. Also the types of ores that are available do not always lend themselves to simple or efficient extraction or recovery. Copper ore at Almalyk in the Uzbek SSR, for example, is believed to be badly oxidized; this causes metallurgical problems, in the utilization of these ores, which the Soviets are not believed to have solved. 13/ Large reserves of copper ore at Dzhezkazgan and at Boshtchekul in Central Asia are in semi-arid regions, where there is a lack of water for treating the ore and where severe climatic conditions are serious obstacles to exploitation. 14/ The results of these difficulties are suggested by official impatience with production achievements and by articles in provincial newspapers describing inefficient operations and attempting to point to those responsible.

One of the deceptive aspects of the Soviet efforts is the emphasis and exertions placed on copper mining and on ore treatment operations which are quantitatively out of proportion to the actual metal recovery in accordance with standards of modern technology under good industrial management. Consequently, there is an expanded capacity which is not utilized except but in part. The poor organization of facilities, inadequate planning, lacks in employee skills, complications in material flows, establishment of norms which are not practical criteria of satisfactory production all contribute to this anomaly.

Some of the cited production problems facing the copper industry of the USSR include the following: lagging mechanization in a number of process steps including the mining, leaching, and concentration (beneficiation) of ores preparatory to smelting; metal losses and delays in the operation of converters; handling difficulties in loading and unloading of copper and its ores; unsatisfactory temperature control and regulation of smelting operations; 15/ inept and incomplete utilization of mining equipment, 16/ and misuse of other specialized equipment available; lack of advanced technological methods for dust recovery and other salvaging processes; slow general adoption of new and progressive techniques as they are developed; poor efficiency in leaching out copper from depleted deposits; losses of copper dissolved in mine waste water because the facilities intended for recovery are run-down and neglected.

An indication of individual plant production difficulties facing the Soviet copper industry was given in a Soviet publication 17/ which stated that the Moskva Copper Smelting and Electrolytic Plant failed to attain the 1952 plan and that the same plant failed to attain its schedule for the first four months of 1953 because of inefficiency, mismanagement, poor labor discipline and inadequate supplies of raw materials. Higher-than-planned losses of copper in slag and over-consumption of fuel were also mentioned as supervisory weaknesses.

In East Germany, considerable losses were reportedly sustained in mining and smelting plants during the 17 June 1953 uprising because of failure of plant employees to come to work and the resulting disruption of operations. Losses from decreased labor productivity since the 17 June uprising were reportedly continuing through the second half of 1953. 18/

In other Bloc Countries, such as China, major production difficulties arise from the scarcity and poor quality of ore reserves.

6. Copper Procurement through Trade with the Free World.

The criticality of copper to the objectives of the USSR is indicated by the great stress laid on its procurement from the free world outside Bloc sources. Difficulties are encountered in careful estimating of the amount of copper which are obtained by Bloc agents despite the embargo under International List I. Inquiries or tentative offers are repeated through several agencies and must be traced to an actual consummation of proposed and successive transactions. Tracing of transhipments also contribute to these difficulties. For this reason, trade intelligence should be followed carefully and interpreted conservatively.

Table 2

Recorded Intra-Bloc Trade in Copper, 1949-1953 21/

Metric Tons

Exporting Country	Date	Importing Country: Bulgaria	China	Czechoslovakia	East Germany	Hungary	Poland	Rumania	USSR
Albania	1950			200					
	1951			200					
	1952	85		253	17		142	210	419
	1953							112 a/	
Bulgaria	1951			300					427
	1952			50					
	1953				552 b/				
China	1951			325					
	1952			132					
Czechoslovakia	1949				76 c/				
	1951	45 d/			946 e/				
	1952	188			900		500		
East Germany	1949			160					
East Austria	1952				3 f/				
Poland	1951			585					
Rumania	1951					770			
	1953		140 g/						
USSR	1949			6,500	3,000				
	1950			16,400 h/	6,000 i/				
	1951				8,019 j/				
	1952			20,000 k/	10,050	18,000 l/			
	1953				5,881 m/				

a. January-April 1953. B. January-June 1953. c. January-March 1949. D. January-November 1951. e. January-June 1951. f. 18 November-31 December 1952. g. 4 January 1953 shipment. h. Planned. i. Trade Agreement; 2,680 metric tons delivered through May 1950. j. January through June; a trade agreement for 8,000 metric tons was signed in September 1951. k. Planned. l. Planned. m. January-June 1953.

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8. The General Use Pattern in the Soviet Bloc

A high percentage of copper consumption goes to military end items such as munitions, and to industries furnishing direct military support. Other industrial consumption can be said to furnish indirect military support, as these consumption sectors add to the over-all economic potential of the Bloc.

Table III gives the best available estimate of 1953 copper consumption in the Soviet Bloc broken down by major categories. As may be seen from the table, production of munitions and military end items account for 20% of total copper supplies. This group includes only the copper consumed in the production of military hardware: ammunition, tanks, aircraft, ordnance, naval equipment, etc. Production of items for direct support of the existing military establishment accounts for another 27%. It must be emphasized that this category includes only the copper consumed in the production of those items which are used to maintain and sustain the existing Bloc military establishment. For example, it has been estimated that 80 percent of total Bloc electronic and communications equipment, wire and cable is being utilized for production of military equipment and improvement of military communications facilities. The remaining 20 percent of electronic and communications equipment goes into general use, and copper consumed in this sector has been listed under "Industrial Production and Expansion", in Table III.

9. Copper Requirements in the Soviet Bloc

Requirements are considerably greater than supply in the Bloc, and deficits between requirements and actual consumption exist. Estimated requirements by Bloc Country are presented in Table IV covering the years 1951 and 1954. Comparing requirements against production for those years, deficits of 196,000 and 225,000 metric tons, respectively, are shown.

It should be noted, for example, that the electric power industry, a key industry for any military and industrial production or expansion, is the largest single consumer of copper. The consumption estimate in Table III assumes a maximum substitution of aluminum for copper. Actual 1953 requirements assuming no substitution have been estimated at over 250,000 metric tons for wire and cable alone. On the basis of US substitution, practice, minimum requirements would be about 100,000 metric tons 34/ as compared with an estimated maximum availability of 80,000 metric tons.

The telecommunications industry furnishes another example of the factors making for copper deficits, and of the magnitude of these deficits, in the Bloc.

The telecommunications resources of the Bloc are considered to be unbalanced in terms of geographic distribution and in terms of the media employed. In Asiatic USSR and in large portions of Communist China, wirelines are much more thinly spaced than in other areas of the Bloc; this condition results in heavy use of the radio medium to fill the void. In strategic Arctic Ocean areas where radio communication is less reliable, the USSR is thus vulnerable to rapid communication service delays and discontinuities. The possibility of electromagnetic jamming of radio circuits adds to this vulnerability. Over-all needs for copper to overcome the Bloc's strategic weakness in this area, neglecting normal growth needs, are estimated to be at least 600 to 700 thousand metric tons. 35/

Considering the Bloc manufacturing capacity, it would not be unreasonable to estimate that if the copper were available they could implement half of this program in five years; that is, they could consume upwards of 60-70,000 metric tons of copper per year for the development of land-line communications alone.

In general, the increase in annual copper requirements follows the expansion of the Bloc economy, and additional needs, such as those outlined above, add to these requirements. Thus, indications are that the differences between requirements and supply will increase over the next few years, with mounting deficits, assuming no relaxation of import controls.

Table III

Estimated Consumption Pattern for Refined Copper Soviet Bloc, 1953 22/

	Metric Tons	Percentage
Munitions and Military End Items	94,000	20
Direct Support of Military Establishment		
Communications Wire and Cable, incl. Field Wire and Coaxial Cable	63,000	
Electronics and Communications Equipment	12,000	
Vehicles (incl. tractors)	5,000	
Other Equipment and Services	2,000	
Stockpiling	47,000	
Subtotal	129,000	27
Industrial Production and Expansion		
Electric Power Cable	80,000	
Electrical Equipment, (incl. motors, generators, transformers, busbars, and switchgears)	30,000	
Electronics and Communications Equipment	16,000	
Communications Equipment	2,000	
Vehicles and Tractors	24,000	
Locomotives and Rolling Stock	12,000	
Industrial Construction	34,000	
Mining and Construction Machinery	2,000	
Subtotal	200,000	42
Consumer Goods	4,000	1
Miscellaneous (not accounted for)	45,000	10
Total Consumption	472,000	

47
53

TABLE IV

Estimates of Soviet Bloc Copper Requirements and Production, 1951 and 1954

(Metric Tons)

Requirements:

Country	1951	1954 32/
Albania	Negligible	Negligible
Bulgaria	6500 23/	8000
Czechoslovakia	60000 25/	70000
East Germany	56000 24/	60000
Hungary	12000 26/	15000
Poland	25000 27/	25000
Rumania	6000 28/	10000
USSR	350000 29/	500000
China	20000 30/	20000
Total Requirements:	536,500	708,000
Estimated Bloc Production:	340,000 31/	483,000 33/
Deficit:	196,000	225,000

10. Indications of Shortages

There are indications of severe shortages of primary copper throughout the Soviet Bloc. On 12 June 1953, Kazakhstan Pravda stated that the Balkash copper smelting plant, one of the largest metallurgical establishments in the USSR had not fulfilled its State Plan for producing crude copper. On 15 December 1953, Pravda (Sverdlovsk) stated that "The present production level of blister and refined copper in the Urals, another important center for the copper industry, is lagging behind the needs of the nation's economy."

A report 36/ states that the Czechoslovakian Main Administration of Electrical Engineering on 3 March 1953 received letters from 10 different plants complaining about the total lack of copper wire for the production of heavy electrical equipment. The same report states that two copper wire plants had to shut down because of lack of copper.

In Rumania, a report states that copper is in shorter supply than any other nonferrous metal. 37/

A permanent shortage of nonferrous metals is declared to exist in East Germany. Although copper and aluminum are continuously smuggled in from West Germany, supplies are reportedly not sufficient to fill the needs of even the most important consumers. 38/

In addition to the specific reports regarding shortages presented above, Bloc attempts to buy copper from Western sources at practically any price and in any quantity also constitute evidence of the critical nature of the copper situation. As an example of the significance attached to obtaining copper by the USSR, it was reported that a British firm reached an agreement with the Soviet trade delegation in London in December 1952 to purchase 150,000 tons of Russian manganese ore at 47 dollars a ton against delivery of electrolytic copper of the same value. 39/ Thus, Moscow apparently needs copper badly enough to be willing to supply the West with strategically critical manganese.

There are also indications that copper wire is a preferred commodity of procurement where available in this form. This may be related to insufficient wire drawing capacity in the Soviet Bloc, in view of the high indicated requirements for wire for war-support and military communication items.

11. Reasons and Effects of Shortages

The main reasons for the shortage of copper are the lag in production in the USSR and in some of the Satellites, and the large requirements for expansion of heavy industry, coupled with technological inadequacies. There is good evidence that the mining, extraction, recovery and smelting of copper has not reached expectations because of many factors. These include a lagging mechanization, organizational delay in starting new enterprises, low labor productivity, inadequate utilization of existing capacity and other production problems, as outlined in an earlier section of this report.

There is evidence that the shortage of copper is having serious effects on industries of military significance throughout the Bloc. Reports indicate that the heaviest impact is on war-support industries. In Czechoslovakia, for example, complaints were received by the Main Administration of Electrical Engineering in March 1953, from ten different plants, complaining about the total lack of copper wire for the production of heavy electrical equipment. 40/

In East Germany, the lack of good quality bearing metal, containing copper, is reported to cause the re-use of old bearing metal in railroad freight car repair. 41/ This bearing metal has lost its desirable qualities and results in frequent "hot boxes", causing freight cars to be out of operation very frequently.

The shortage of copper has also caused many production difficulties in Rumania. There have been extensive efforts to develop substitutes for copper and substitutions have been put into effect without determing fully the greater utilization of equipment and other technical difficulties involved. As a result, return to copper has been necessary in many cases, requiring re-establishment of previous processes with inevitable complications and loss of time. Examples of this were attempts to substitute for bronze in transmission forks for tractors and the use of iron instead of brass in radiator

tubes. In both cases the use of the original copper alloy had to be re-adopted. The use of iron in radiator tubes doubled production time, since additional heat processing was necessary. Also, the greater hardness of the iron created new problems in assembly. 42/

Two large Moscow electrical plants were among a number of undertakings which pledged themselves to conserve nonferrous metals in May 1953, 43/ indicating that even in the USSR there is a need for conserving copper even in one of its most important applications.

12. Reserves Maintained by the Soviet Bloc

Two major categories of copper reserves are maintained in the Soviet Bloc: normal operating stocks, and strategic stockpiles. Normal operating stocks include plant, commercial and seasonal inventories and other types of stored stocks. The strategic stockpiles or state reserves, differ from the operating stocks in the fact that the storage agent for these strategic stockpiles cannot release them for use without specific authorization from the state. 44/

Normal operating stocks of copper in the USSR according to an early plan, should be one half of production for a year, or six months supply. Three months supply is to be held at producing plants and three months supply at consuming plants. Reports indicate that, for the Satellite Countries at least, operating stocks of this size have not been attained, however. One report, from Czechoslovakia, stated that the entire stock of copper for the production of copper wire in Czechoslovakia was expected to last only one month, from 23 March 1953. 45/ A recent report from East Germany indicates that East German reserves of copper were drawn on "to an appreciable extent" during the third quarter of 1953. 47/

An estimate of the strategic stockpile of copper in the USSR in 1952 has been made, 46/ based on an estimate for 1949 (from reports from returned prisoners of war who had worked at metal storage depots) plus annual increases of 10 percent of total production. This method results in an estimate of 238,600 metric tons of copper in the USSR state reserves in 1952, or about 75 percent of the estimated annual rate of consumption for the USSR in that year.

13. Purpose of Reserves

Although USSR stockpiles of copper can probably be assumed to be of minimum adequacy because of the high priority assigned to them in Russia, the fragmentary evidence available indicates that Satellite stockpiles are not as large as the importance of the commodity and its critical supply situation demand. These stockpiles are of great importance to the Bloc, especially in the event of wartime disruption of the economy, including plan changes, major transportation breakdowns and other supply difficulties. In view of the far-flung nature of the copper industry in the USSR, the protection against transport disruptions afforded by strategic stockpiles seems especially important. Adequate stockpiles of copper (and other strategically important materials) give the Bloc greater freedom to undertake aggressive action in international situations, and they can also be used to remedy a serious breakdown in the system of material flows in peacetime.

14. Adjustments Forced on the Bloc by the Present Controls

The present controls on copper have slowed the pace of industrial and military expansion throughout the Bloc and have forced upon it costly adjustments to the critical copper supply situation.

These controls by cutting off supplies from the Free World, are forcing the USSR to export copper to the European Satellites and to China. This has aggravated the USSR domestic copper supply limitations by diverting copper from essential applications or from strategic stockpiles. In spite of imports from the USSR, the Satellites are critically short of copper and have restricted its use to the most essential uses. Even for these important uses, the supply of copper does not appear to be sufficient; lack of copper is therefore causing costly production delays, and is forcing the use of inferior substitutes which often require additional equipment, increased production time and often results in sub-standard quality in end-products.

The state reserves of copper in the Satellites are also being drawn upon as a result of the serious shortage. Also, in an effort to circumvent present controls, the Bloc countries have paid premium prices for copper shipments diverted from the Free World, and have been forced to barter commodities of strategic value to the West for copper.

15. The Trend of Bloc Imports if Controls are Relaxed

The magnitude of known Bloc procurement efforts for copper is indicated in the 233,000 metric tons included in the categories of tonnage actually acquired and that which was intercepted or of unknown outcome during 1953 and the first quarter of 1954. The some 100,000 metric tons on which administrative action was taken would be multiplied considerably if export controls were not in force. Evidences of willingness by Bloc countries to pay high prices, employ complicated clandestine trading channels and use their short dollar supply in these procurement efforts also indicate a potentially substantial increase in imports from the West, if controls should be relaxed.

Should controls be relaxed, it is quite certain that Czechoslovakia and Poland would immediately import significant quantities of copper from the West, ~~in order to accelerate the Bloc timetable of war preparation.~~ Both of these Bloc countries have firmly established trading networks in Latin America (an important source of copper to the Bloc) and both Poland 48/ and Czechoslovakia 49/ have recently offered to buy copper from countries in this area.

The available intelligence information also indicates that the USSR would also be a large direct importer of copper from the West if controls were dropped. Continuing Soviet offers to buy large quantities of Chilean Copper directly as well as indirectly (through Western European intermediaries) imply that Soviet imports of this strategic commodity falls well short of her needs. In September 1953, the USSR offered to buy 50,000 tons of copper from Chile, 50/ and various Western European middlemen are constantly attempting to procure copper for the USSR through clandestine channels.

16/ Effect on China of Relaxing Import Controls in Respect to the European Satellites and the USSR.

Within the limits of availability of copper in the World Market and Chinese import needs for copper, all available information indicates that Eastern European Bloc countries would be very likely to import Western copper for re-export to China if controls were relaxed.

Free world demand for copper has decreased considerably since the early part of 1953. Consequently, a large quantity of unsold copper is available in the World Market. This situation is especially pronounced in Chile, where in September 1953, there was an unsold copper stock of 100,000 tons. The drop in demand has forced the price from 35 cents per pound to under 30 cents per pound. The desperate economic situation in Chile has attracted offers by several Bloc countries to buy Chilean copper at prices above the market price. Poland is reported to have purchased 5,000 tons of Chilean copper through the West German refining company, Norddeutsch Affinerie in Hamburg 51/ and the USSR offered to buy 50,000 tons of copper directly from Chile in September 1953. 52/ There are several other countries which might supply the Orbit with copper in the event that controls are relaxed; Turkish copper has been offered to the Bloc several times.

China's production of copper is very small. Planned production of electrolytic copper in Manchuria in 1953 was about 6,640 tons; 53/ Chinese requirements for copper are estimated at approximately 20,000 tons a year. 54/ Although a large part of these requirements are imported from the Bloc, there are several indications that the Chinese are attempting to import significant quantities of copper from the West. For example, a recent State Department report states, that 6,000 tons of copper ingots may be enroute to China from the Belgian Congo. 55/

17. The Contributions Imports Would Make to the Military Potential of the Bloc.

Imports, by alleviating the shortage of copper, would enable the Bloc to accelerate military and military support production. Bloc output of aircraft, ships, tanks, ordnance, ammunition, electronic and power transmission equipment, and numerous other defense and heavy-industry items would benefit from the increased supply of copper. In addition to an increase in quantity of output the quality of copper-consuming equipment and products would be improved, since the use of imperfect substitutes for copper will no longer be forced upon the Bloc. These increases in the quantity and quality of output will add substantially to the military potential of the Bloc. They will also enable earlier and more effective timing of military preparations and enable the Bloc to take advantage of opportune events.

In addition to the production benefits outlined, unrestricted imports of copper would allow strengthening of strategic stockpiles in the USSR and the Satellites, and decrease their vulnerability to industrial or military interruption.

Where European Satellite stockpiles have been depleted to meet critical production shortages they could be replenished and increased well beyond their original size. Regarding the USSR, even if stockpiles are assumed to be of minimum adequacy because of the high priority assigned to them, there is little doubt that substantial additions to these reserves would result, from import relaxation. These increased stockpiles would be, of course, of tremendous importance to the military and economic potential of the Bloc. They could be used as a remedy for breakdowns in the peacetime systems of materialsflows due to planning deficiencies. Even more importantly, they would furnish protection against wartime disruption of the USSR and Satellite economies and against wartime breakdowns in intra-orbit and east-west traffic in copper. Thus, they would greatly strengthen the ability of the Bloc to undertake aggressive action and allow more selectivity in respect to its timing.

Appendix A

An Estimate of the Magnitude of Soviet Efforts to Obtain Copper, 1953 - April 1954

Copper* in its most important forms, is subject to embargo to the Soviet Bloc under International List I. Throughout the period of embargo it has been sought after by Bloc agents and has been probably the subject of more intelligence reports from all sources than any other single strategic item.

The attached Table No. I presents an estimate of the intensity and degree of success of the Soviet Bloc procurement effort for 1953 and the first four months of 1954. The figures therein should be considered with certain of their aspects in mind.

1. The cases reported herein were covered by reports supported by documentary evidence, on-the-spot investigation by US personnel, or by information from reliable sources. A large number of reports which were deemed less reliable have been excluded. It may be noted, however, that they refer (exclusive of duplication as nearly as may be determined) to over 400,000 tons.

The period since May 1953 is more completely covered than the earlier months of 1953, owing to the development of a centralized program of surveillance of East-West trade transactions. Furthermore, some areas are more proficient than others in developing and reporting information on illegal transactions. This estimate is, therefore, based on a sample.

2. The data used may include some duplicate reporting on transactions. An effort has been made to exclude some duplications, but this is not always possible owing to the existence of interlocking rings of East-West traders, and to overlapping or competitive efforts to buy and sell. Consequently, the data presented should not be taken as pure aggregates but as indications of the intensity of the Bloc's efforts to procure a highly strategic commodity.

3. It is not possible to measure the extent to which the mere existence of the control program is a deterrent to operations which are known by traders to lack official approval. For that reason the data presented with respect to procurement efforts which are interrupted by administrative action should not be interpreted as indicating fully the effectiveness of the export control program.

4. It was necessary to estimate the total value of the copper involved in procurement efforts since price data are not fully reported. The estimates are calculated on the basis of $785 per ton, approximately $0.355 a pound. Although this is about five and a half cents per pound or $125 per ton above the market price in effect through most of 1953 and early 1954, the basis appears to be conservative. A sizeable number of prices in the 800-900 range were reported for this period. Most of these were probably c.i.f. a Western European port, or Gdynia.

*No attempt has been made in this paper to distinguish among the different forms of copper. In general, the object of Soviet procurement is electrolytic copper, 99.9 percent pure.

It is evident that the Bloc has been greatly interested in procuring copper. A total of 138 cases are presented here, covering 233,000 metric tons, valued at an estimated 185 million dollars. This total is divided into three significant categories as follows:

a. At least 41,000 metric tons, valued at nearly $34 million, were diverted to the Soviet Bloc.

b. Efforts to procure an additional hundred thousand tons, valued at $78 million, were interrupted by administrative action.

c. With respect to procurement efforts involving 92 thousand tons, valued at $73 million, it has not yet been possible to determine the final outcome.

Category "a" includes those cases where the available information indicates definitely that diversion was completed. This figure is considered to be a minimum one.

Category "b" is an estimate of the amount of copper whose journey to the Bloc has been interrupted, if not halted, by administrative action. Such action ranges from refusal to issue an export license, based on the outcome of end-use checks to actual seizure of goods while in movement to the Bloc. In the first instance, there is, of course, no certainty that the interruption becomes any more than a temporary frustration. The modus operandi may simply be changed. A vivid example is that of the attempt to secure Turkish copper by means of a forged Austrian IC; when this failed, a second unimaginative attempt, similar in all details to the first except for the serial number on the forged IC, was made to secure Mexican copper. The tonnage, in such a case, has been included in category "b" only once, although it does not necessarily follow that the trader would have rested on his laurels had the first attempt been successful. Also the frustration of a single attempt may have a wider application than to the tonnage of immediate interest. Omitted from category "b" are several instances where an inquiry, not yet an offer, has been answered by a government official in the negative; also, those cases where the amount of copper was so large as to cast doubt on the likelihood of consummation of the deal had there been no interference. Such omissions amounted to an additional eleven reports covering a total of 71,500 metric tons of copper.

The category "b" figure may despite these omissions contain some exaggeration, as may category "c". Perhaps not all duplications have been disentangled; even more likely, the vicissitudes of commerce might well prevent a number of the "deals" from reaching a final conclusion. This is probably an important factor, particularly in the instance of an illegally traded commodity. There are constant offers to sell and to buy on the part of various intermediaries which come to naught. Neither side wishes to commit itself without "performance bonds" or some other evidence of good faith on the part of the other party. There are pages of reports on the operations of one trader, all revolving around a projected deal of 10,000 tons of Chilean copper, which never quite "come off". These obviously ephemeral cases have been excluded from both categories. It is possible, of course, that a number of cases included in these categories may not develop further; however, only those have been included where the procurement effort is definite and persistent.

Category "c" may include some ultimately completed diversions as well as a number which will be frustrated, either legally or commercially. The final outcome of many may, of course, never be known.

There is yet another category, not included in the table, which calls for mention. This includes reports which have some characteristics of rumour, which lack confirmation or knowledge of subsequent development, or which include questionable details. A total of 21 cases, covering 311,600 tons are covered herein.. The amounts of copper reported in individual cases are unusually large, thirty thousand, fifty thousand and even 100,000 tons. These reports occurred during the period of negotiation for the sale of 100,000 tons of the Chilean stockpile to the United States, when most of the Chilean copper was held off the world market. There is reason to believe that a number of "operators" were laying their plansin anticipation of the breakdown of the negotiations. Since the negotiations were successfully concluded and Chile has given assurance that she will not sell to the Bloc, it may be assumed that most of these grandiloquent plans will fade away.

25X1C8b [redacted]

25X1C8b [redacted] It would appear, however, that such a breakdown gives a more discriminating picture of the Bloc's efforts to secure copper, as well as the success of the West in thwarting those efforts. Although CIA's figure for completed diversions should be considered a minimum, (undoubtedly there have been shipments never uncovered) the CIA total figure of 233 thousand tons gives a more complete idea of the Bloc's determined efforts to obtain copper.

Parenthetically, copper was reported as one of the three principal categories of strategic commodities in which the Bloc showed interest in bilateral talks with Western European nations at the recent ECE meeting in Geneva.

Table I

An Estimate of the Magnitude of Soviet Efforts to Obtain Copper, 1953 - April, 1954

Category*	Number of Cases	Quantity (metric tons)	Value (000's omitted)
a. Diversions completed	45	41,489	$ 33,568**
b. Procurement efforts-interrupted	50	99,503	78,110
c. Procurement efforts-outcome undetermined	43	92,425	72,554
TOTAL	138	233,417	$184,232

25X1C8b [redacted]

**In the classification of the above cases a few of those in "b" and "c" might properly be included in either category. In each instance the decision was necessarily arbitrary, but was made on the basis of informed judgment.

Appendix B

Documentation

25X1X7el

1. [redacted]
2. [redacted]
3. Battelle Memorial Institute, Special Report, Group II, No. 1, Role of Technology in the Future of Copper, Columbus, Ohio, 26 Sept. 51. U.
4. Ibid. P. 26.
5. Documentation for Table 1:

   1953 USSR - ORR/M/NF estimate
   China - ORR/M/NF estimate, NIE 87
   Albania - ORR/M/NF estimate, NIE 65
   Bulgaria - ORR/M/NF estimate, NIE 87
   Czechoslovakia - ORR/M/NF estimate
   East Germany - ORR/M/NF estimate, based on 9.5 months production, CS, 25 Nov. 1953, S. Evaluation B-3, (RR-3).
   Poland - ORR/M/NF estimate, NIE 87
   Rumania - ORR/M/NF estimate, NIE 87

   1954 USSR - ORR/M/NF estimate
   China - ORR/M/NF estimate NIE 87
   Albania - ORR/M/NF estimate, NIE 87
   Bulgaria - ORR/M/NF estimate, NIE 87
   Czechoslovakia - ORR/M/NF estimate
   East Germany - ORR/M/NF estimate, CS, 17 Sept. 1953, S. Eval. C-3, (RR-3) and NIE 87.
   Poland - ORR/M/NF estimate, NIE 87
   Rumania- ORR/M/NF estimate, NIE 87

   1955 Production:
   USSR - ORR/M/NF estimate
   China - ORR/M/NF estimate, NIE 87
   Albania - Ibid.
   Bulgaria - Ibid.
   Czechoslovakia - Ibid.
   East Germany - ORR/M/NF estimate based on CS, 17 Sept. 1953, S. for primary production and estimated secondary production.
   Poland - ORR/M/NF estimate NIE 87
   Rumania - Ibid.

   Capacity:
   All capacity figures are ORR/M/NF estimates

6. U. S. Dept. of Interior, Bureau of Mines, Mineral Trade Notes, Vol. 36, No. 1, (Jan. 1953), U.
7. CIA CS, 25 Nov. 1953. S. B-3.
8. Table I.
9. CS, 7 Jan 1954, S. B-3.
10. Table I.

11. OO, 9 Jan 1951. C.

12. FDD Report U-3033 A 15624, 12 Mar 1953. R. 25X1A9a

13. ORE/M/NF Memorandum, [redacted] 10 May 1954, P. 6. S.

14. Ibid., pp. 4, 5.

15. OO, 13 Jan 1954. U.

16. OO, 21 Feb 1951. C.

17. Vechernyaya Moskva, No. 119, 22 May 1953, P. 2 (T. 1. 146352).

18. CS, 14 Oct. 1953. S. C-3.

19. D/E Contribution to Project No. 24,321, 12 May 54 (attached as Append. A. to this review) S.

20. U. S. Dept. of Commerce, Bureau of Foreign Commerce, and United Nations statistics on trade, U.

21. Estimates of Intra-Bloc trade are based on material from the following documents:

ALBANIA

25X1X4 [redacted] 31 March 1953 Secret/US ONLY B-Doc
21 Feb. 1953 " " "
8 June 1953 " " 3
31 March 1953 " " 3
FDD, UC-246, 30 Dec.53 " " C-Doc
25X1X4 [redacted] 4 March 1953 " " 3
Estimate files, D/M/NF Secret

25X1X4 BULGARIA

25X1X4 [redacted] 31 March 1953 Secret/US ONLY 3
[redacted] 6 October 1953 " " 3
25X1X4 [redacted] 5 Feb. 1953 " " 3
Estimate files, D/M/NF Secret

CHINA

Estimate files, D/M/NF Secret

CZECHOSLOVAKIA

[redacted] 5 Feb. 1953 Secret/US ONLY 3
25X1X4 27 Feb. 1953 " " 3
17 Dec. 1952 " " 3
Estimate files, D/M/NF Secret

EAST AUSTRIA

25X1X4 [redacted] 13 April 1953 Secret/US ONLY 3

EAST GERMANY

25X1X4 [redacted] 20 June 1953 Secret B-3
Estimate files, D/M/NF Secret

HUNGARY

25X1X4 [redacted] 3 March 1953 Secret 3

POLAND

25X1X4 [redacted] 13 Nov. 1951 Secret F-Doc

RUMANIA

Estimate files, D/M/NF Secret
SO, 5 Feb. 1953 Secret/US ONLY 3
Navy, 4271, 8 Jan. 1953 Confidential
State, Despatch #324
Bucharest Secret/US ONLY
28 May 53

USSR

Army, 7880 MID, Report RB-51D-51, 4 June 1951, Secret, C-3
25X1X4 [redacted], 11 January 1954, Secret/US ONLY
[redacted]16 October 1953, Secret/US ONLY
Estimate files, D/M/NF, Secret

22. Munition and Military End Items consumption based on EIC-R-2, 19 December 1952, p. 97, S; other consumption estimates based on contributions to this project from I/EE; I/TH; I/MM; S/COM; S/CST; M/EP; M/CI; A/X; A/MIL.

23. FDD Report U-1907, A-8356, May 1952. R. (RR-3)

24. FDD No. 1/50, 10 Jan. 1950. S. (RR-2)

25. ORR/M/NF estimates

26. American Legation Report No. 69, 6 June 1949. C.

27. OO, 9 Jan 1951. C. Excerpts Katowice Newspaper. (RR-3)

28. Based on American Legation Report No. 45, 14 Apr. 1948. U. (RR-3)

29. ORR/M/NF estimate. Various sources, see M/NF Contribution to O. W. Project 57-51, Oct. 1952 for methodology.

25X1X7 30. [redacted]

31. ORR/M/NF estimate

32. All requirements for 1954 are ORR/M/NF estimates based on estimated rates of increase from 1951.

33. See Table I, this report

34. CIA M/EP Contribution to Project 24.321, 10 May 1954, S.

35. S/COM Contribution to Project 24.321, 17 May 1954. S.

36. CS, 14 Apr. 1953, S. F-3.

37. OO, 2 May 1952. R.

38. Army, USAREURIC, 513th MIG, RT-385-53 (El-1517) 13 Jan 1954. C.

39. OCI Current Intelligence Digest, 5 Jan. 1953. S. Content: 3.

40. CS, 14 Apr. 1953. S. F-3.

41. CS, 15 Mar. 1954. S. F-3.

42. OO, 2 May 1952. R.

25X1X7 43. [redacted]

44. ORR, A/Xs Contribution to Project No. 24.321, May 1954 S.

45. CS, 14 Apr. 1953. S. F-3.

46. ORR/M/NF Contribution to O. W. o.l, 27 July 1953, S.

25X6A 47. Cable Sitrep 101, [redacted] 22 Dec. 1953. S.

48. CS, 5 Mar. 1954. S. C-3; CS Sept. 1953. S. B-3.

49. CS, 10 Dec. 1953. S. B-2.

50. American Embassy, Santiago, 17 Sept. 1953. C.

51. CS, 5 Nov. 1954. S. C-3.

52. American Embassy, Santiago, 17 Sept. 1953. C.

53. OCI Weekly, No. 4523, 26 Mar. 54. S.

25X1X 54. [redacted]

55. US State Dept., 6 May 1954. S.